

Amendments to the Claims

and

Listing of Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Claims 2, 3, 7, 9, 10, and 14 are amended.

Claims 1, 4, 5, 11, 12, 16, 18, and 19-22 are canceled without prejudice.

Claims 23-28 are added.

1. (canceled)

2. (currently amended) A semiconductor element comprising:

a field-effect transistor including a source electrode provided on a first surface side of a semiconductor body, a drain electrode provided on a second surface side opposite to the first surface side, a first conductivity type semiconductor that includes a first conductivity type drift region and is included in the semiconductor body, and a second conductivity type semiconductor included in the semiconductor body; and

a Schottky diode formed by contact between the first conductivity type semiconductor and a metal electrode,

wherein the semiconductor body includes a first conductivity type semiconductor substrate and a first conductivity type epitaxial growth layer formed on the first conductivity type semiconductor substrate,

wherein the field-effect transistor and the Schottky diode are arranged such that a first depletion layer stemming from the Schottky diode is superimposed on a second depletion layer spreading around the second conductivity type semiconductor in an off-state of the field-effect transistor.

The semiconductor element according to claim 1, wherein the semiconductor body includes a region for a group of transistors in which a plurality of the field-effect transistors are formed, and the field-effect transistors are insulated gate field-effect transistors,

each of the insulated gate field-effect transistors further comprising:

a first conductivity type source region formed in the second conductivity type semiconductor, and a gate electrode provided on an insulating film formed on the first surface side,

wherein in each of the insulated gate field-effect transistors,

the second conductivity type semiconductor is provided on the first surface side; and

the source electrode is provided so as to be in contact with the second conductivity type semiconductor and the source region,

wherein the Schottky diode is included in the region for a group of transistors and is formed by contact between the drift region exposed between the transistors on the first surface side and the metal electrode.

3. (currently amended) A semiconductor element comprising:

a field-effect transistor including a source electrode provided on a first surface side of a semiconductor body, a drain electrode provided on a second surface side opposite to the first surface side, a first conductivity type semiconductor that includes a first conductivity type drift region and is included in the semiconductor body, and a second conductivity type semiconductor included in the semiconductor body; and

a Schottky diode formed by contact between the first conductivity type semiconductor and a metal electrode,

wherein the semiconductor body includes a first conductivity type semiconductor substrate and a first conductivity type epitaxial growth layer formed on the first conductivity type semiconductor substrate,

wherein the field-effect transistor and the Schottky diode are arranged such that a first depletion layer stemming from the Schottky diode is superimposed on a second depletion layer spreading around the second conductivity type semiconductor in an off-state of the field-effect transistor,

~~The semiconductor element according to claim 1, wherein the semiconductor body includes a region for a group of transistors in which a plurality of the field-effect transistors are formed, and the field-effect transistors are insulated gate field-effect transistors,~~

~~each of the insulated gate field-effect transistors further comprising:~~

a first conductivity type source region formed in the second conductivity type semiconductor, a recess that penetrates the source region and the second conductivity type semiconductor to reach the first conductivity type drift region, and a gate electrode on an insulating film formed in the recess,

wherein in each of the insulated gate field-effect transistors,

the second conductivity type semiconductor is provided on the first surface side; and

the source electrode is provided so as to be in contact with the second conductivity type semiconductor and the source region;

wherein the Schottky diode is included in the region for a group of transistors and is formed by contact between the drift region exposed between the transistors on the first surface side and the metal electrode.

4-6. (canceled)

7. (currently amended) The semiconductor element according to claim [1] 23, wherein the silicon carbide is obtained by causing epitaxial growth on a surface of a silicon carbide substrate that is either one of the following I and II to form a silicon carbide layer:

I. (111) Si plane of β -SiC, (0001) Si plane of 6H or 4H-SiC, or Si plane of 15R-SiC, or offcut planes within 10 degrees of these Si planes; and

II. (100) plane of β -SiC, (110) plane of β -SiC, (1-100) plane of 6H or 4H-SiC, (11-20) plane of 6H or 4H-SiC, or offcut planes within 15 degrees of these planes.

8. (canceled)

9. (currently amended) A semiconductor element comprising:

a field-effect transistor including a source electrode provided on a first surface side of a semiconductor body, a drain electrode provided on a second surface side opposite to the first surface side, a first conductivity type semiconductor that includes a first conductivity type drift

region and is included in the semiconductor body, and a second conductivity type semiconductor included in the semiconductor body; and

a Schottky diode formed by contact between the first conductivity type semiconductor and a metal electrode,

wherein the semiconductor body includes a first conductivity type semiconductor substrate and a first conductivity type epitaxial growth layer formed on the first conductivity type semiconductor substrate,

wherein the field-effect transistor and the Schottky diode are arranged closely so that a second conductivity type semiconductor other than said second conductivity type semiconductor is not interposed between the field effect transistor and the Schottky diode,

~~The semiconductor element according to claim 8, wherein the semiconductor body includes a region for a group of transistors in which a plurality of the field-effect transistors are formed, and the field-effect transistors are insulated gate field-effect transistors,~~

each of the insulated gate field-effect transistors further comprising:

a first conductivity type source region formed in the second conductivity type semiconductor, and a gate electrode provided on an insulating film formed on the first surface side,

wherein in each of the insulated gate field-effect transistors,

the second conductivity type semiconductor is provided on the first surface side; and

the source electrode is provided so as to be in contact with the second conductivity type semiconductor and the source region,

wherein the Schottky diode is included in the region for a group of transistors and is formed by contact between the drift region exposed between the transistors on the first surface side and the metal electrode.

10. (currently amended) A semiconductor element comprising:

a field-effect transistor including a source electrode provided on a first surface side of a semiconductor body, a drain electrode provided on a second surface side opposite to the first surface side, a first conductivity type semiconductor that includes a first conductivity type drift region and is included in the semiconductor body, and a second conductivity type semiconductor included in the semiconductor body; and

a Schottky diode formed by contact between the first conductivity type semiconductor and a metal electrode,

wherein the semiconductor body includes a first conductivity type semiconductor substrate and a first conductivity type epitaxial growth layer formed on the first conductivity type semiconductor substrate,

wherein the field-effect transistor and the Schottky diode are arranged closely so that a second conductivity type semiconductor other than said second conductivity type semiconductor is not interposed between the field effect transistor and the Schottky diode,

The semiconductor element according to claim 8, wherein the semiconductor body includes a region for a group of transistors in which a plurality of the field-effect transistors are formed, and the field-effect transistors are insulated gate field-effect transistors,

each of the insulated gate field-effect transistors further comprising:

a first conductivity type source region formed in the second conductivity type semiconductor, a recess that penetrates the source region and the second conductivity type semiconductor to reach the first conductivity type drift region, and a gate electrode on an insulating film formed in the recess,

wherein in each of the insulated gate field-effect transistors,

the second conductivity type semiconductor is provided on the first surface side; and

the source electrode is provided so as to be in contact with the second conductivity type semiconductor and the source region;

wherein the Schottky diode is included in the region for a group of transistors and is formed by contact between the drift region exposed between the transistors on the first surface side and the metal electrode.

11-13. (canceled)

14. (currently amended) The semiconductor element according to claim [8] 26, wherein the silicon carbide is obtained by causing epitaxial growth on a surface of a silicon carbide substrate that is either one of the following I and II to form a silicon carbide layer:

I. (111) Si plane of β -SiC, (0001) Si plane of 6H or 4H-SiC, or Si plane of 15R-SiC, or offcut planes within 10 degrees of these Si planes; and

II. (100) plane of β -SiC, (110) plane of β -SiC, (1-100) plane of 6H or 4H-SiC, (11-20) plane of 6H or 4H-SiC, or offcut planes within 15 degrees of these planes.

15. (previously presented) The semiconductor element according to claim 3, wherein, in an on-state of each of the insulated field-effect transistors, a channel extends along the thickness direction of the semiconductor body in the second conductivity type semiconductor, wherein the surface of the recess is covered with an insulating film.

16. (canceled)

17. (previously presented) The semiconductor element according to claim 10, wherein, in an on-state of each of the insulated field-effect transistors, a channel extends along the thickness direction of the semiconductor body in the second conductivity type semiconductor, wherein the surface of the recess is covered with an insulating film.

18-22. (canceled)

23. (new) The semiconductor element according to claim 2, wherein the semiconductor body is made of silicon carbide.

24. (new) The semiconductor element according to claim 3, wherein the semiconductor body is made of silicon carbide.

25. (new) The semiconductor element according to claim 24, wherein the silicon carbide is obtained by causing epitaxial growth on a surface of a silicon carbide substrate that is either one of the following I and II to form a silicon carbide layer:

I. (111) Si plane of β -SiC, (0001) Si plane of 6H or 4H-SiC, or Si plane of 15R-SiC, or offcut planes within 10 degrees of these Si planes; and

II. (100) plane of β -SiC, (110) plane of β -SiC, (1-100) plane of 6H or 4H-SiC, (11-20) plane of 6H or 4H-SiC, or offcut planes within 15 degrees of these planes.

26. (new) The semiconductor element according to claim 9, wherein the semiconductor body is made of silicon carbide.

27. (new) The semiconductor element according to claim 10, wherein the semiconductor body is made of silicon carbide.

28. (new) The semiconductor element according to claim 27, wherein the silicon carbide is obtained by causing epitaxial growth on a surface of a silicon carbide substrate that is either one of the following I and II to form a silicon carbide layer:

I. (111) Si plane of β -SiC, (0001) Si plane of 6H or 4H-SiC, or Si plane of 15R-SiC, or offcut planes within 10 degrees of these Si planes; and

II. (100) plane of β -SiC, (110) plane of β -SiC, (1-100) plane of 6H or 4H-SiC, (11-20) plane of 6H or 4H-SiC, or offcut planes within 15 degrees of these planes.